



MODIS Science Software and Product Versioning

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MODIS Versioning



Introduction

- Versioning currently is *Ad Hoc*
- Need for formal convention recognized by Science Team
- White paper on versioning released
 - Discusses versioning framework science software and products
 - Input from the Science Team members and developers requested
- Implementation details and impact still need to be addressed

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Requirements for Versioning

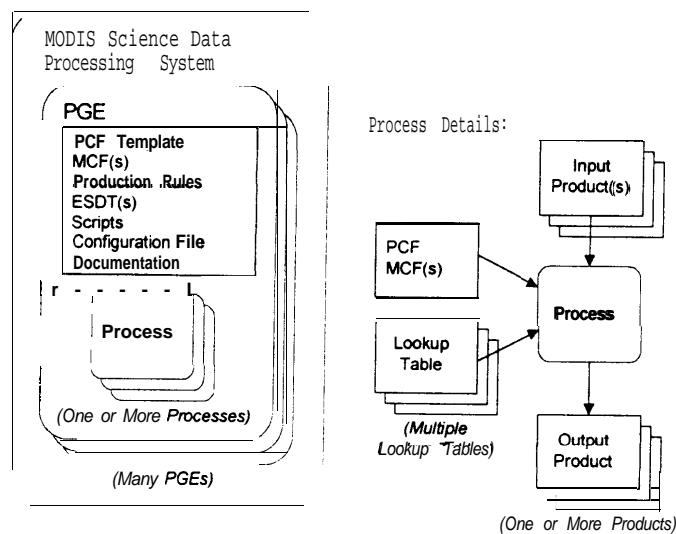
1. Easy to understand
2. Provides a unique label for elements in the system that may change
3. Conveys information about the significance of a science algorithm change
4. Conveys information about the version of the system

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Where Versioning is Used



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Versioning Summary

Area	Format	Example	Location in Output Product	Where Stored
System	<i>major. minor</i>	2.1	external to product; table of individual elements' versions	SDST CM
Process	<i>major. minor. update</i>	2.1.8	ProcessVersion - Inventory Metadata Product Specific Attribute (PSA)	Process Include File
PGE	<i>major.minor update</i>	2.3.1	PGEVersion - Inventory Metadata Attribute	PCF Template
ESDT	integer from 0 to 255	2	VersionID - Inventory Metadata Attribute	MCF
Lookup Table	free form	2.3	none specified. possibly as part of file name in InputPointer Inventory Metadata Attribute	File Name or Internal to the Table
Product	<i>major. minor. update</i>	2.1.3	LocalVersionID - Inventory Metadata Attribute and as Part of Local Granule ID	PCF Template



System Version

- Major and minor version numbers - example: 2.1
- Labels a “virtual” build of the system
 - Changes when one or more PGEs becomes incompatible with a given system
- Major version - signifies a major project milestone
 - Controlled by Science Team leader
 - e.g., 3.x is the first major reprocessing
- Minor version - documents a unique internally-compatible version
 - Controlled by SDST and science team
 - Documented in system description document
 - Change interval: 3-12 months
- One-way mapping from system version to versions of elements
- Not stored in product



Process Version

- Major, minor and update version numbers - example: 2.1.3
- Labels science software
- Major version - signifies a major project milestone
 - Changes when significant changes to process are made near major project milestone
 - Synchronizes processes with milestones (only if process changes)
- Minor version - signifies a change to the science algorithm(s)
 - Controlled by science team member
 - Large number of changes are discouraged to prevent end-user confusion
- Update version - any other changes
 - Error message changes
 - Minor changes to product format
- Updates to software libraries (or the like) are handled on a case-by-case basis
- Product location: *ProcessVersion* ECS Inventory Metadata PSA
- Likely be stored in include file, e.g., "version.h"
- Some scientists (ceans) may also identify each algorithm in product uniquely using *VerParm_**

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PGE Version

- Major, minor and update version numbers - example: 2.1.3
- Labels all items tied to a PGE:
 - MCFs, PCF templates, etc.
 - But not processes
- Loosely tied to version of its processes
 - Major/minor/update version number changes when corresponding process version changes
 - Not the same because PGE can contain multiple processes
 - Updates to other (non-process) items usually change the update version number
- Product location: *PGE Version* ECS Inventory Metadata
- Stored in PCF template -runtime parameter
 - Single LUN for all PGEs

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Product Version

- Should identify significant changes in the product science content
 - SCF determines "significant"
 - Not a problem if the call is false
- Major, minor and update version numbers - example: 2.1.3
- Similar to process version
 - Major - resynchronize at major milestones
 - Minor - change in science content
 - Update - any other changes
- May include
 - Software/algorithm changes
 - Changes to the production rules
 - Changes to lookup tables
- Product location
 - *LocalVersionID* ECS Inventory Metadata
 - Part of *LocalGranuleID* - "v" prefix; "." replaced with "_"; e.g., v2_1_3
- Stored in PCF template - runtime parameter; unique for each product



Product History String

- Concatenation of product history strings of all input products
 - Duplicates removed
 - Only highest version kept for each input ESDT
 - Current product version added to front
 - e.g., "MOD09:2.2.3 MOD35_L2:2.1.0
MOD02QKM:2.2.3 ..."
- Helps to identify some (not all) changes in upstream products
- Product location: *ProductionHistory* ECS Archive Metadata



ESDT

- CM Version - form unknown
 - Internally tracks specific set of ECS files related to the ESDT
 - Used by the DAAC for configuration control
- Public Version - integer from 0 to 255
 - Distinguishes different sub-types of ESDTs
 - Changes when any inventory metadata field is deleted or when a mandatory metadata field is added
 - Other changes controlled by the SCF
 - Number of changes should be minimized
- Public version affect product ordering via ECS interface
 - Must select ESDT/version before selecting other search criteria
 - Future enhancements (when?) will allow searching across multiple versions
- Public version stored in MCF and written to *VersionID* ECS Inventory Metadata

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Lookup Table

- Free form format
 - Use by the SCF
 - May be part of file name or internal to file
- File name:
 - Clearly delineated field - like: "lookuptable.v12.dat" is the 12th version
- Internal: Text vs. Binary
 - Clearly documented in either case
 - Binary - should be accessible through "string | grep" commands
 - Text - should be easily identifiable
- Should be some information in each product which identifies which version was used in generating the product
- Unified policy is not established
 - Strongly urge obvious versioning: version number in filename
 - Discourage hidden versions (binary implementation internal to file)

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Implementation

- Most scientists will implement using current internal tools/ techniques
- SDST may develop modify common library routines for
 - Local granule ID
 - Product history
- Phase-in planned
 - Expected in any new or updated code deliveries
- SDST will
 - register metadata changes with ECS
 - coordinate LUN assignments
 - will maintain a versioning web page reference for all

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Issues

- Some areas are not fully defined
 - ESDTs
 - Lookup tables
- Still complicated (see #1 in the requirements)
- Need approval/consensus on this framework to move forward
 - Any major problems?
 - Need something in place before launch
 - Will be useful in pre-launch testing
- Discussion

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Versioning Implementation Steps and Status

Robert Wolfe, July 13, 1999

1. An update should be made to the software delivery guide to reflect new things we need the scientist to include in their code in the future to support versioning:
 - a. version.h (c) and version.inc (fortran) files for the process version
 - b. PCF lun for storing PGE (same for all PGEs) and product versions (PGE specific)
 - c. Add the ProcessVersion PSA to all products
 - d. Change the local granule ID naming convention to support the product version in the file name and LocalGranuleID field.
 - e. Discuss the production history string.

Once this is done, everyone must be informed that the guide has changed and that future deliveries must conform to the guide.

Status: Some progress. A concrete example is needed to start things off. A common PCF lun for PGE versions has been implemented.

2. The CM system should be set up to support tracking versioning.

Status: On its way. Version numbers are included in email "code baselined" notifications from CM. More changes in the scripts are being implemented. CM is also labeling each version of processes with version numbers. Everybody has started using unique 3-digit versions instead of 2-digit.

3. The web page needs to be set up to display the system version and elements within it.

Status: Jack Schols "builds" spreadsheet is a good start. This process needs to be more automated (created directly from the source) and put on the Web.

4. A utility function needs to be developed to create a new production history string based on a set of input production history strings and the current product version. The function then needs to be distributed to the team.

Status: No progress.

5. We need to ask ECS to implement some form of versioning for all data accessible through the toolkit (DEM, leap seconds, UT1/UTC, etc.).

Status: No progress.

6. At some point we should consider B. Vollmer's suggestion for tracking the compile time versioning information: compiler version and toolkit versions, etc. Is there a place in the archive metadata for this?

Status: No progress.

7. We should consider if there is any versioning information that should be written to the LogStatus tile when a process runs. The process version would be the most useful. A common format would be helpful.

Status: No progress.

8. Determine what if anything should we do with the Algorithm Package fields in the archive metadata?

Status: No progress.

9. Implementing mechanisms in our CM so that we can
 - a) retrieve any version at will, and
 - b) make a particular set of versions visible to the developers through Export Views.

Status: No progress.

10. Collapsing the ClearCase VOB directory structure so that we don't have a unique directory path for each version of each process or file specification.

Status: No progress.

11. Continue revising the information distribution mechanism (the e-mails that go out when code reaches particular states).

Status: No progress.

12. Devise other SDST-internal tools, and changes to our procedures, so that our CM can do things more rapidly and less error-prone.

Status: Some progress.

13. Reorganize how we store static ancillary files so that we can version them.

Status: No progress.

14. Redesign build procedures for MODAPS to take advantage of versioning.

Status: Some progress.

15. Version MCFs/ESDTs.

Status: No formal method implemented. File comparison used to verify differences. Some discussions held with ECS.

EXAMPLE

This file shows the following:

- (a) What was changed in the PGE
- (b) Why was it changed
- (c) How the output product will be affected by the change
- (d) The date of the change

v2.2.4 5/24/1999

- =====
1. Added cnt.QA_MissingData for counts tally in MOD_PR10_AAmain.c .
 2. Made correction to the reflectance conversion values with the scale and offset as described in CCR 445. MOD_PR10_Process_L1B.c was modified.

v2.2.3 5/10/1999

- =====
1. Restructured the decision logic for the case of snow-covered inland water in module MOD_PR10_CopyGEOmetaToSnow.c. The output product is not affected, other than making a more "accurate" result.

v2.2.2 4/13/1999

- =====
1. Added PGE07.mk, PGE07.pl, PGE07.ciList, ancfiles.csh, vdc.csh and driver.csh files. Updated README.txt, HISTORY.txt, packinglist, and MOD_PR10.prod_rule.txt .
 2. Changed the QA mcf to MOD_PRLM_QA.mcf in PCF file.
 3. Renamed MOD10_PR.prod_rule.txt to MOD_PR10.prod_rule.txt .

v2.2.1 4/6/1999

- =====
1. Code was changed to read MOD02 v2.1.3 format. The output product is not affected by this change.
 2. Other minor revisions:
 - Changed the value of AlgorithmPackageMaturityCode from "launch" to "pre-launch".
 - Changed the value of AlgorithmPackageAcceptanceDate to "1999-04-06".
 - Changed the value of SPSOParameters from "TBD" to "none".
 - Added #include <time.h> in MOD_PR10_AAmain.c .
 - Changed the _FillValue for SDSs from 0 to 255.
 - Changed to read the new 250- and 500-meter SDS names in the L1B file.

V2.2.0 1/25/1999

- =====
1. Changed the reflectance calculation to use the L1B data and solar zenith data.
 2. Added new global attributes to MOD10 and new local attributes to the snow cover SDS.
 3. Added handling of land/water mask categories.
 4. Added a new class of snow-covered lake ice to the product. Integrated the decision process for snow-covered lake ice into the code with only minor revision to the code structure.
 5. Integrated error messages into the code.
 6. Added logic to read additional QA information from the L1B (MOD02) input and write it into the MOD10 product as HDF global or local attributes.
 7. Added #include <time.h> in MOD_PR10_AAmain.c (DTS MODx101240 "MOD_PR10_V2.2 fails to build").

Command used to start this script's run:
/home/mlinda/batch/getVersions.sh

getVersions.sh (/home/mlinda/batch/getVersions.sh) ver 1^o Jul 12:02
start execution -- 12 Jul 99 18:32:20 EDT

PGE	MOD_PR	EXPORT_VIEW (baselined)	EXPORT_DEV (Engr_Test)	EXPORT_TST (I&T)	EXPORT_OPS (Operations)
PGE01		V2.1.2 - 07/02/99	V2.1.2 - 07/02/99	V2.1.2 - 07/02/99	V2.1.2 - 07/02/99
PGE02		V2.2.1 - 07/09/99	V2.2.1 - 07/09/99	V2.2.1 - 07/09/99	V2.2.1 - 07/09/99
PGE03		V2.4.1 - 06/17/99	V2.4.1 - 06/17/99	V2.4.1 - 06/17/99	V2.4.1 - 06/17/99
PGE04		V2.3.0 - 06/07/99	V2.3.0 - 06/09/99	V2.3.0 - 06/09/99	V2.3.0 - 06/09/99
PGE05		V2.3.0 - 06/02/99	V2.3.0 - 06/02/99	V2.3.0 - 06/02/99	V2.3.0 - 06/02/99
PGE06		V2.3.1 - 06/02/99	V2.3.1 - 06/02/99	V2.3.1 - 06/02/99	V2.3.1 - 06/02/99
PGE07		V2.2.4 - 05/26/99	V2.2.4 - 05/26/99	V2.2.4 - 06/17/99	V2.2.4 - 06/18/99
PGE08		V2.2.5 - 06/08/99	V2.2.5 - 06/01/99	V2.2.5 - 06/16/99	V2.2.5 - 06/18/99
PGE09		V2.2.8 - 07/08/99	V2.2.8 - 06/07/99	V2.2.8 - 07/08/99	V2.2.8 - 07/08/99
PGE10		V2.2.8 - 07/08/99	V2.2.8 - 05/28/99	V2.2.8 - 07/08/99	V2.2.8 - 07/08/99
PGE11		V2.2.3 - 06/02/99	V2.2.3 - 06/02/99	V2.2.3 - 06/16/99	V2.2.3 - 06/18/99
PGE12		V2.1.4 - 07/09/99	V2.1.4 - 07/09/99	V2.1.4 - 07/09/99	V2.1.4 - 07/09/99
PGE13		V2.1.4 - 07/09/99	V2.1.4 - 06/17/99	V2.1.4 - 07/09/99	V2.1.4 - 07/08/99
PGE14		V2.1.4 - 07/09/99	V2.1.4 - 07/08/99	V2.1.4 - 07/09/99	V2.1.4 - 07/08/99
PGE15		V2.1.4 - 07/09/99	V2.1.4 - 06/17/99	V2.1.4 - 07/09/99	V2.1.4 - 07/08/99
PGE16		V2.1.9 - 07/09/99	V2.1.9 - 06/30/99	V2.1.9 - 07/01/99	V2.1.9 - 07/01/99
PGE17		V2.1.1 - 05/24/99	V2.1.1 - 06/10/99	V2.1.1 - 06/10/99	V2.1.1 - 06/10/99
PGE18		- - - - -	- - - - -	- - - - -	- - - - -
PGE19		V2.1.1 - 05/28/99	V2.1.1 - 06/10/99	V2.1.1 - 06/10/99	V2.1.1 - 06/10/99
PGE20		V2.2.7 - 07/08/99	V2.2.7 - 06/17/99	V2.2.7 - 07/08/99	V2.2.7 - 07/08/99
PGE21		V2.2.8 - 06/16/99	V2.2.8 - 06/09/99	V2.2.8 - 06/09/99	V2.2.8 - 06/09/99
PGE22		V2.1.1 - 06/16/99	V2.1.1 - 05/28/99	V2.1.1 - 06/16/99	V2.1.1 - 06/18/99
PGE23		- 12/08/98	- - - - -	- - - - -	- - - - -
PGE24		- - - - -	- - - - -	- - - - -	- - - - -
PGE25		V2.0.5 - 07/12/99	V2.0.5 - 05/19/99	V2.0.5 - 05/19/99	V2.0.5 - 06/03/99
PGE26		- - - - -	- - - - -	- - - - -	- - - - -
PGE27		- - - - -	- - - - -	- - - - -	- - - - -
PGE28		- - - - -	- - - - -	- - - - -	- - - - -
PGE29		V2.1.7 - 06/16/99	V2.1.7 - 06/09/99	V2.1.7 - 06/09/99	V2.1.7 - 06/09/99
PGE30		- - - - -	- - - - -	- - - - -	- - - - -
PGE31		- 03/16/99	- - - - -	- - - - -	- - - - -
PGE32		- - - - -	- - - - -	- - - - -	- - - - -
PGE33		V2.1.6 - 07/09/99	V2.1.6 - 06/04/99	V2.1.6 - 06/16/99	V2.1.6 - 06/18/99
PGE34		- 03/16/99	- - - - -	- - - - -	- - - - -
PGE35		- 06/08/98	- - - - -	- - - - -	- - - - -
PGE36		- 11/13/98	- - - - -	- - - - -	- - - - -
PGE37		- 11/13/98	- - - - -	- - - - -	- - - - -
PGE38		- 11/13/98	- - - - -	- - - - -	- - - - -
PGE39		- - - - -	- - - - -	- - - - -	- - - - -
PGE40		- 11/17/98	- - - - -	- - - - -	- - - - -
PGE41		- 02/09/99	- - - - -	- - - - -	- - - - -
PGE42		- - - - -	- - - - -	- - - - -	- - - - -
PGE43		V2.1.3 - 07/09/99	V2.1.3 - 05/28/99	V2.1.3 - 05/28/99	V2.1.3 - 06/02/99
PGE44		- 10/20/98	- - - - -	- - - - -	- - - - -
PGE45		V2.1.4 - 06/16/99	V2.1.4 - 06/09/99	V2.1.4 - 06/09/99	V2.1.4 - 06/09/99
PGE46		- - - - -	- - - - -	- - - - -	- - - - -
PGE47		- - - - -	- - - - -	- - - - -	- - - - -
PGE48		- - - - -	- - - - -	- - - - -	- - - - -
PGE49		- - - - -	- - - - -	- - - - -	- - - - -
PGE50		- - - - -	- - - - -	- - - - -	- - - - -
PGE51		V2.1.7 - 6/10/99	V2.1.7 - 06/10/99	V2.1.7 - 06/10/99	V2.1.7 - 06/10/99
PGE52		- - - - -	- - - - -	- - - - -	- - - - -

PGE53	- / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE54	- / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE55	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE56	V2.3.1 - 07/12/99	V2.3.1 - 07/12/99	V2.3.1 - 07/12/99	V2.3.1 - 07/12/99
PGE57	V2.3.4 - 07/09/99	- - - / - - / -	V2.3.4 - 07/09/99	V2.3.4 - 07/09/99
PGE58	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE59	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE60	- 03/01/99	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE61	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE62	- / - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE63	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE64	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE65	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE66	- 09/23/98	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE67	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE68	- - - / - - / -	- - - / - - / -	- - - / - - / -	- - - / - - / -
PGE69	V2.3.3 - 06/11/99	V2.3.3 - 06/02/99	V2.3.3 - 07/08/99	V2.3.3 - 07/08/99
PGE70	V2.3.3 - 07/07/99	- - - / - - / -	V2.3.3 - 07/07/99	V2.3.3 - 07/08/99
PGE71	V2.0.2 - 06/28/99	- / - / -	- - - / - - / -	- - - / - - / -
PGE72				
PGE73				
PGE74				
PGE75				
PGE76				
PGE77				
PGE78				
PGE79				
PGE80				

end execution 12 Jul 99 13:41 37 EDT